

Remarks/Arguments:

Claim Status:

Claims 1-8, 10-19, 21-33 and 35-48 are pending in the present case. The features of claim 9 have been included in amended claim 8. The features of claim 20 have been included in amended claim 25. The features of claim 34 have been included in amended claim 26. Thus, claims 9, 20 and 34 have been canceled without prejudice or disclaimer of the subject matter thereof.

Claim 8, as amended, is directed to a coiled heat exchanger having a coiled tube with the combined features of (1) an outer diameter of about 1 1/8 inches or greater and (2) a ratio of outer diameter to coil inner radius of about 0.19:1 or greater.

Claim 25, as amended, is directed to a coiled heat exchanger having the combined features of (1) a coiled tube and (2) a support member connected to coils of the coiled tube on alternating sides of the support member.

Claim 26, as amended, is directed to a system for heating water having the combination of (1) a water storage tank; (2) at least one tube mounted within the tank; (3) a fitting connected to an end portion of the tube and to the tank and oriented along a first direction; (4) a reinforcement member coupled to the coiled portion of the tube and to the water storage tank and oriented along a second direction substantially perpendicular to the first direction; and (5) a support member, separate from the reinforcement member, contacting coils of the coiled portion of the tube.

New claims 43-48 have been added, and support for these claims is found throughout the specification and drawings. No new matter is being presented by the claim amendments and new claims, and accordingly Applicants respectfully request entry and consideration of these claims.

New claim 43 is directed to a system for heating water having the combined features of (1) a fitting connected to an end portion of a tube along a first axis and (2) at least one support member connected to a coiled portion of the tube, each support member extending

substantially along an axis that is radially offset from the first axis. New claims 44-46 are directly or indirectly dependent on claim 43.

New claim 47 is directed to a system for heating water having a reinforcement member having the combined features of (1) a first end portion coupled to a water storage tank and (2) a second end portion coupled to only one coil of a coiled portion of a tube mounted within the tank.

New claim 48 is directed to a system for heating water having a reinforcement member having the combined features of (1) an upper end portion coupled to a water storage tank and (2) a lower end portion coupled to an upper end portion of a tube mounted within the tank.

Claim Rejection Under 35 U.S.C. § 102(e):

Claims 8, 12, and 16 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Michelfelder et al. (U.S. Patent No. 6,789,615). Applicants respectfully traverse the rejection of these claims and respectfully submit that these claims are patentable over Michelfelder et al. for the reasons set forth below.

Independent claim 8 has been amended to include the features of originally filed claim 9. No new matter has been added. Independent claim 8, as amended, recites limitations that are neither disclosed nor suggested by Michelfelder, namely:

A coiled heat exchanger configured for use in a water heater, said coiled heat exchanger comprising: a coiled tube for directing the flow of fluid through said heat exchanger, said coiled tube having a tube outer diameter and a coil inner radius; wherein said outer diameter of said tube is about 1½ inches or greater and the ratio of said outer diameter of said tube to said coil inner radius is about 0.19:1 or greater.

The outer diameter of the coiled tube influences the size of the coiled tube's heat exchange surface area and the overall pressure drop realized by the coiled tube. Applicants discovered that an efficient yet compact heat exchange system can be provided by maintaining or increasing the outer diameter of the coiled tube while maintaining or decreasing the inner radius at which the tube is coiled. Despite the perceived difficulties associated with coiling a larger diameter tube into an acceptable inner radius, Applicants discovered that a coiled tube having an outer diameter of about 1-1/8 inches or greater combined with a ratio of about

0.19:1 or greater for the outer diameter to the coil inner radius can in fact be produced and that such a coiled tube facilitates the assembly of the heat exchanger within the space constraints of a water heater system, all while maintaining or increasing the level of heat transfer and maintaining or reducing the pressure drop through the coiled tube. The combination of the stated tube outer diameter size and the stated ratio of the outer diameter to the coil inner radius is a novel feature of Applicants' claimed invention.

In contrast, Michelfelder et al. neither disclose nor suggest a coiled tube of diameter of about 1-1/8 inches or greater *in combination with* an outer diameter to coil inner radius ratio of about 0.19:1 or greater. Michelfelder et al. therefore fail to disclose or suggest every element of Applicants' claimed invention.

Accordingly, for the foregoing reasons, Applicants respectfully submit that independent claim 8, as amended, is patentable over Michelfelder et al. and should be allowed. Claims 12 and 16 are dependent upon claim 8, and therefore should also be allowed at least as dependent upon an allowable base claim. Reconsideration of claims 8, 12 and 16 is respectfully requested.

Rejections Under 35 U.S.C. § 103(a)

Claims 9-11, 13-15, and 17-19 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Michelfelder et al. (U.S. Patent No. 6,789,615). As stated previously, claim 9 has been canceled and claim 8 has been amended to incorporate the features of claim 9. Applicants respectfully traverse the rejection of these claims and respectfully submit that these claims are patentable over Michelfelder et al. for the reasons set forth below.

As explained above, Michelfelder et al. neither disclose nor suggest a heat exchanger tube of diameter of about 1-1/8 inches or greater *in combination with* a ratio of about 0.19:1 or greater for the outer diameter to the coil inner radius as recited in each of claims 10, 11, 13-15 and 17-19. Applicants respectfully submit that it would not have been obvious to modify the swimming pool heat exchanger taught by Michelfelder et al. in such a way as to arrive at Applicants' claimed invention of a coiled tube having the combination of a specific minimum outer diameter and specific minimum ratio of the outer diameter to the coil inner radius.

Michelfelder et al. fail to disclose or suggest every element of Applicants' claimed invention and the Office Action fails to identify any motivation or suggestion to modify the Michelfelder et al. swimming pool heat exchanger to arrive at Applicants' claimed heat exchanger.

Accordingly, because claims 10, 11, 13-15, and 17-19 include limitations that are neither disclosed nor suggested by Michelfelder et al., prima facie obviousness cannot be established based on the cited reference. Reconsideration of claims 10, 11, 13-15, and 17-19 is respectfully requested.

Claims 20-25 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Michelfelder et al. (U. S. Patent No. 6,789,615) in view of Kim (U.S. Patent No. 6,098,705). As stated previously, claim 20 has been canceled and claim 25 has been amended to incorporate the features of claim 20. Applicants respectfully traverse the rejection of these claims and respectfully submit that these claims are patentable over Michelfelder et al. and Kim for the reasons set forth below.

Claim 25 has been rewritten in independent form and claims 21, 23 and 24 have been amended to be dependent upon claim 25. Independent claim 25, as amended, recites limitations that are neither disclosed nor suggested by Michelfelder et al. or Kim, alone or in combination, namely:

A coiled heat exchanger configured for use in a water heater, said coiled heat exchanger comprising: a coiled tube for directing the flow of fluid through said heat exchanger; a support member contacting coils of said coiled tube, wherein *said support member is connected to coils of said coiled tube on alternating sides of said support member.*

As shown in the exemplary embodiment depicted in Applicants' Figure 3, and for purposes of illustration only, the support members are connected on alternating sides at every convolution of the coiled tube. Such a configuration reduces movement of the coils with respect to one another, assisting in securing the overall stability of the heat exchange assembly. As stated within Applicants' specification on page 12, and by way of non-limiting example, "by applying welds to alternating sides of the support members on adjacent coils of the coiled tube the support member is prevented from rolling about its longitudinal axis. Such rolling may be more apt to occur if the support member were to be welded along only one of its sides."

In contrast, Michelfelder et al. and Kim, alone or in combination, fail to disclose or suggest connecting a support member to the coils of the coiled tube on alternating sides of the support member. Michelfelder et al. does not disclose or suggest any support member connected to the coiled tube. Kim does not suggest or show a support member connected to alternating sides of the coiled tube on adjacent coils. Michelfelder et al. and Kim, alone or in combination, therefore fail to disclose every element of Applicants' claimed invention.

Accordingly, because claim 25 includes limitations that are neither disclosed nor suggested by Michelfelder et al. or Kim, alone or in combination, prima facie obviousness cannot be established based on the cited references. Claims 21-24 are dependent upon claim 25, and therefore should also be allowed at least as dependent upon an allowable base claim. Reconsideration of claims 21-25 is respectfully requested.

Claims 1-5 and 7 stand rejected under 36 U.S.C. 103(a) as being unpatentable over Olson (U.S. Patent No. 1,921,259) in view of Hawkins (U.S. Patent No. 5,971,444). Applicants respectfully traverse the rejection of these claims and respectfully submit that these claims are patentable over Olson and Hawkins for the reasons set forth below.

Independent claim 1 recites a limitation which is neither disclosed nor suggested by Olson or Hawkins, alone or in combination, namely:

A heat exchange assembly adapted for use in a water tank, said heat exchange assembly comprising: a tube having end portions and a coiled portion between said end portions; and a fitting connected to at least one of said end portions of said tube, said fitting having an end configured to extend through an opening in the water tank and a *surface positioned to limit the extension of said end through the opening in the water tank*, and said fitting also having an opposite end *defining a bore* configured to receive one of said end portions of said tube and to limit the extension of said end portion of said tube into said opposite end of said fitting, *wherein said bore extends axially beyond said surface*.

As shown in the exemplary embodiments depicted in Applicants' Figures 8A and 8B, and for purposes of illustration only, the bore 28 extends axially beyond the surface 24, with respect to surface 26. As stated within Applicants' specification on page 16, and by way of non-limiting example, "Because the surface 50 of the bore 28 is positioned axially beyond the surface 24 toward an exterior of the water storage tank, the movement of the coiled tube is further limited with respect to the water storage tank along the second direction "B." The configuration of the counterbore's interior annular shoulder 50 in relation to the annular shoulder surface 24 further assists in securing the overall stability of the heat exchange assembly 10 within the water tank 12 during the various manufacturing, shipping, handling, installation, and operation processes."

In contrast, Olson and Hawkins, alone or in combination, fail to disclose or suggest a bore that extends axially beyond a surface positioned to limit the extension of the coiled tube. The Office Action states that the fitting (12 of Hawkins) describes a bore that extends axially beyond a surface (22 of Hawkins), at page 4 of the office action. However, contrary to the

structure recited in claim 1, the location of the bore shown in the Hawkins reference does not extend axially beyond the surface (25 of Hawkins). In fact, Hawkins teaches that the bore should terminate prior to reaching the indicated surface (25 of Hawkins). Olson and Hawkins, alone or in combination, therefore fail to disclose every element of Applicants' claimed invention.

Accordingly, because claim 1 includes limitations that are neither disclosed nor suggested by Olson or Hawkins, alone or in combination, prima facie obviousness cannot be established based on the cited references. Claims 2-5 and 7 are dependent upon claim 1, and therefore should also be allowed at least as dependent upon an allowable base claim. Reconsideration of claims 1-5 and 7 is respectfully requested.

Claim 6 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Olson (U.S. Patent No. 1,921,259) in view of Hawkins (U.S. Patent No. 5,971,444) and further in view of Lane (U.S. Patent No. 1,062,015). Applicants respectfully traverse the rejection of this claim and respectfully submit that this claim is patentable over Olson, Hawkins and Lane for the reasons set forth below.

Dependent claim 6 recites a limitation which is neither disclosed nor suggested by Olson, Hawkins or Lane, alone or in combination. As explained above, Olson and Hawkins, alone or in combination, fail to disclose or suggest a bore that extends axially beyond a surface positioned to limit the extension of the coiled tube. Furthermore, Lane does not disclose or suggest a fitting with a counterbore feature. Lane, therefore fails to overcome the deficiencies of the Olson and Hawkins references.

Accordingly, because claim 6 includes limitations that are neither disclosed nor suggested by Olson, Hawkins or Lane, alone or in combination, prima facie obviousness cannot be established based on the cited references. Reconsideration of claim 6 is respectfully requested.

Claims 26, 27 and 37-40, stand rejected under 35 U.S.C. 103(a) as being unpatentable over Olson (U.S. Patent No. 1,921,259) in view of Shepard et al. (U.S. Patent No. 591,505). Applicants respectfully traverse the rejection of these claims and respectfully submit that these claims are patentable over Olson and Shepard for the reasons set forth below.

Claim 26 has been amended to include the limitations of claim 34. Claim 37 has also been amended. No new matter has been added.

Independent claim 26, as amended, recites limitations that are neither disclosed nor suggested by Olson or Shepard et al., alone or in combination, namely:

A system for heating water, said water heating system comprising: a water storage tank adapted to contain a water supply; at least one tube connected to contain a recirculating water supply, said tube being mounted within said water storage tank, said tube having at least one end portion fixed with respect to said water storage tank and a coiled portion extending from said end portion; a fitting connected to said end portion of said tube and to said water storage tank, said fitting being oriented along a first direction and configured to reduce movement of said end portion of said tube with respect to said water storage tank along said first direction; a reinforcement member coupled to said coiled portion of said tube and to said water storage tank, said reinforcement member being oriented along a second direction substantially perpendicular to said first direction and configured to reduce movement of said coiled portion of said tube with respect to said water storage tank along said second direction; and a *support member, separate from said reinforcement member*, contacting coils of said coiled portion of said tube.

As shown in the exemplary embodiments depicted in Applicants' Figures 1, 2A 2B and 2C, and for purposes of illustration only, the support members (44) are not connected to the reinforcement member (32). The position of the reinforcement member (32) relative to the fitting (18), as shown in Figure 2C, functions to minimize the movement of the coiled portion of the tube with respect to the water storage tank 12 along the second direction "B."

To provide adequate clearance for the fittings and minimize the space between the inner cylindrical wall of the water storage tank and the coiled tube according to one embodiment of the invention, the support members (44) are positioned away from the side of the water storage tank that is opposite the fittings (18). However, the side of the water storage tank that is opposite the fittings (18) is the location of the reinforcement member according to an embodiment of this invention. Therefore, because optional positions of the support members and the reinforcement member are not collinear, the support members are separate from the reinforcement member (32).

In contrast, Shepard et al. fail to disclose or suggest a coiled tube support member separate from a reinforcement member that links the coiled tube to the water storage tank. In further contrast, Olson does not disclose or suggest a support member or a reinforcement member attached to the coiled tube assembly.

Independent claim 37, as amended, recites limitations that are neither disclosed nor suggested by Olson or Shepard et al., alone or in combination, namely:

In a system for heating water having a water storage tank adapted to contain a water supply and a tube assembly connected to contain a recirculating water supply, a method for mounting the tube assembly within the water storage tank comprising the steps of: inserting the tube assembly into the water storage tank along a first direction; *extending a portion of a fitting of the tube assembly through a wall of the water storage tank from within the water storage tank along a second direction at an angle to the first direction*; coupling the fitting of the tube assembly to the water storage tank along the second direction, thereby reducing movement of the tube assembly with respect to the water storage tank along the second direction; and attaching a reinforcement member of the tube assembly to the water storage tank along the first direction, thereby reducing movement of the tube assembly with respect to the water storage tank along the first direction.

As shown in the exemplary embodiments depicted in Applicants' Figure 1, and for purposes of illustration only, a portion of the fitting (18) of the tube assembly (15) extends through a wall of the water storage tank (36) from the interior of the tank. In contrast, the fitting (7) of Olson does not extend through the wall of the water storage tank (1). The Olson reference discloses a bushing like connecting member (14) which fastens the fitting (7) to the interior wall water storage tank (1). In further contrast, Shepard et al. does not disclose or suggest a fitting attached to the end of the coiled tube.

Accordingly, because claims 26 and 37 include limitations that are neither disclosed nor suggested by Olson or Shepard et al., alone or in combination, prima facie obviousness cannot be established based on the cited references. Claims 27 and 38-40 are dependent upon claims 26 and 37, respectively, and therefore should also be allowed at least as dependent upon an allowable base claim. Reconsideration of claims 26, 27, 37-40 is respectfully requested.

Claims 28-32 and 34 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Olson (U.S. Patent No. 1,921,259) in view of Shepard et al. (U.S. Patent No. 591,505) and Hawkins (5,971,444). As stated previously, claim 34 has been canceled and claim 26 has been amended to incorporate the features of claim 34. No new matter has been added. Applicants respectfully traverse the rejection of these claims and respectfully submit that these claims are patentable over Olson, Shepard et al. and Hawkins for the reasons set forth below.

Dependent claim 28 recites a limitation which is neither disclosed nor suggested by Olson, Shepard et al. or Hawkins, alone or in combination. As explained above, Olson and Hawkins, alone or in combination, fail to disclose or suggest a bore that extends axially beyond a surface positioned to limit the extension of the coiled tube. Shepard et al. do not disclose or suggest a fitting coupled to a coiled tube. Shepard et al. therefore fail to overcome the deficiencies of the Olson and Hawkins references.

Accordingly, because claim 28 includes limitations that are neither disclosed nor suggested by Olson, Shepard et al. or Hawkins, alone or in combination, prima facie obviousness cannot be established based on the cited references. Claims 29 and 30 are dependent upon claim 28 and therefore should also be allowed at least as dependent upon an allowable base claim. Reconsideration of claims 28-30 is respectfully requested.

Dependent claims 31 and 32 recite limitations which are neither disclosed nor suggested by Olson, Shepard et al. or Hawkins, alone or in combination. As explained above, Olson and Shepard et al., alone or in combination, fail to disclose or suggest a coiled tube support member *separate* from a reinforcement member that links the coiled tube to the water storage tank. Hawkins, alone or in combination, with the other cited references, does not disclose or suggest a support member separate from the reinforcement member that links the coiled tube to the water storage tank. Hawkins therefore fails to overcome the deficiencies of the Olson and Shepard et al. references.

Accordingly, because claims 31 and 32 include limitations that are neither disclosed nor suggested by Olson, Shepard et al. or Hawkins, alone or in combination, prima facie obviousness cannot be established based on the cited references. Reconsideration of claims 31 and 32 is respectfully requested.

Claims 35, 36, 41, and 42 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Olson (U.S. Patent No. 1,921,259) in view of Shepard et al. (U.S. Patent No. 591,505) and further in view of Kim (U.S. Patent No. 6,098,705). Applicants respectfully traverse the rejection of these claims and respectfully submit that these claims are patentable over Olson, Shepard et al. and Kim for the reasons set forth below.

Claims 35 and 36 are dependent upon independent claim 26, which has been amended. Claims 41 and 42 are dependent upon independent claim 37, which has been amended.

Dependent claims 35 and 36 recite limitations which are neither disclosed nor suggested by Olson, Shepard et al. or Kim, alone or in combination. As explained above, Olson and Shepard et al., alone or in combination, do not disclose or suggest a coiled tube support

member *separate* from a reinforcement member that links the coiled tube to the water storage tank. Furthermore, Kim does not disclose or suggest a coiled tube support member separate from a reinforcement member that links the coiled tube to the water storage tank. Kim therefore fails to overcome the deficiencies of the Olson and Shepard et al. references.

Furthermore, with respect to Applicants' dependent claim 41, the Olson reference teaches away from welding a fitting to a surface of the water storage tank. Refer to the Olson specification, Column 1, lines 10-20:

In the event that it is desired to remove coil 6 it is only necessary to remove cover 2, unscrew members 14 and raise the coil from the shell ... permits of *ready assembly and disassembly* of the joint while providing a tight joint. It can also be appreciated that the *joint may be broken and remade many times...*

A fitting which is welded to the water storage tank, as described in Applicants' claim 41, does not facilitate ready assembly and disassembly of the fitting and the coil, nor does it support the act of "breaking and remaking" the fitting joint numerous times, as recited in the Olson reference. Similarly, the combined features of claim 42 are not found in the proposed combination of references.

Accordingly, because claims 35, 36, 41, and 42 include limitations that are neither disclosed nor suggested by Olson, Shepard et al. or Kim, alone or in combination, prima facie obviousness cannot be established based on the cited references. Reconsideration of claims 35, 36, 41 and 42 is respectfully requested.

Claim 33 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Olson (U.S. Patent No. 1,921,259) in view of Shepard et al. (591,505) and Kim (U.S. Patent No. 6,098,705) and further in view of Michelfelder et al. (U.S. Patent No. 6,789,615). Applicants respectfully traverse the rejection of this claim and respectfully submit that this claim is patentable over Olson, Shepard et al., Kim and Michelfelder et al. for the reasons set forth below.

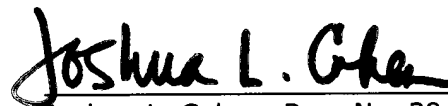
Dependent claim 33 recites limitations which are neither disclosed nor suggested by Olson, Shepard et al., Kim or Michelfelder et al., alone or in combination. As explained above, Olson and Shepard et al., alone or in combination, do not disclose or suggest a coiled tube support member separate from a reinforcement member that links the coiled tube to the water storage tank. Furthermore, neither Kim nor Michelfelder et al. disclose or suggest a coiled tube support member separate from a reinforcement member that links the coiled tube to the water storage tank. Kim and Michelfelder et al., alone or in combination, therefore fail to overcome the deficiencies of the Olson and Shepard et al. references.

Accordingly, because claim 33 includes limitations that are neither disclosed nor suggested by Olson, Shepard et al., Kim and Michelfelder et al., alone or in combination, prima facie obviousness cannot be established based on the cited references. Reconsideration of claim 33 is respectfully requested.

Conclusion

In view of the amendments in the claims and the remarks set forth above, Applicants respectfully submit that this application is now in condition for allowance, which action is respectfully requested.

Respectfully submitted,



Joshua L. Cohen, Reg. No. 38,040
Brett J. Rosen, Reg. No. 56,047

JLC/BR/ks/ap

Dated: February 15, 2005

☒ P.O. Box 980
Valley Forge, PA 19482
(610) 407-0700

☐ P.O. Box 1596
Wilmington, DE 19899
(302) 778-2500

The Commissioner for Patents is hereby authorized to charge payment to Deposit Account No. 18-0350 of any fees associated with this communication.

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail, with sufficient postage, in an envelope addressed to:
Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on:

2/15/05
